What is claimed is:

1. An optical waveguide type filter provided with a periodically perturbation part in a part of an optical waveguide in a longitudinal direction thereof; wherein a line perpendicular to a level plane of said periodically perturbation part is tilted with respect to an optical axis of said optical waveguide; and wherein, when said optical waveguide is made linear without twisting, said optical waveguide includes a portion where a plane formed by a line passing a given point on said optical axis in said periodically perturbation part and being perpendicular to a level plane passing said given point and said optical axis varies depending on a position of said given point in the longitudinal direction thereof.

2. An optical waveguide type filter according to claim 1, wherein said plane has a part rotated about the optical axis with respect to the longitudinal direction of the optical waveguide.

3. An optical waveguide type filter according to claim 1, wherein said periodically perturbation part is divided into a plurality of groups in the longitudinal direction of the optical waveguide, said plane is fixed within each group but not varies between one group and another group.

4. An optical waveguide type filter according to claim 3, wherein said periodically perturbation part is divided into N groups in the longitudinal direction of the optical

waveguide, said planes in respective groups shift from each other at intervals of 90 degrees/(N-1) about the optical axis.

5. A method of making an optical waveguide type filter provided with a periodically perturbation part in a part of an optical waveguide in a longitudinal direction thereof, said method comprising the steps of forming an optical waveguide with a periodically perturbation part such that a line perpendicular to a level plane of said periodically perturbation part is tilted with respect to an optical axis of said optical waveguide while a plane formed by a line passing a given point on said optical axis and being perpendicular to said level plane and said optical axis is fixed; then twisting the part formed with the periodically perturbation part about said optical axis in the longitudinal direction thereof; and securing the twisted part so as not to be untwisted.

6. A method of making an optical waveguide type filter according to claim 5, wherein, when twisting said optical waveguide about the optical axis in the longitudinal direction thereof, said twisting is carried out while monitoring a polarization-dependent loss of said optical waveguide, and said optical waveguide is secured so as not to be untwisted at the time when the polarization-dependent loss is minimized.

7. A method of making an optical waveguide type filter

provided with a periodically perturbation part in a part of an optical waveguide in a longitudinal direction thereof, said method comprising the steps of twisting a part of the optical waveguide about an optical axis in a longitudinal direction thereof so as to form a part of said optical waveguide with a periodically perturbation part such that a line perpendicular to a level plane of said periodically perturbation part is tilted with respect to an optical axis of said optical waveguide while a plane formed by a line passing a given point on said optical axis and being perpendicular to said level plane and said optical axis is fixed; and then untwisting said optical waveguide.

8. An optical fiber amplifier comprising, at least, an erbium-doped optical fiber and a pumping laser light source; wherein an optical waveguide type filter is inserted as a gain equalizer in an amplifier circuit, said optical waveguide type filter being provided with a periodically perturbation part in a part of an optical waveguide in a longitudinal direction thereof;

wherein a line perpendicular to a level plane of said periodically perturbation part is tilted with respect to an optical axis of said optical waveguide; and

wherein, when made linear without twisting, said optical waveguide includes a portion where a plane formed by a line passing a given point on said optical axis in said periodically perturbation part and being perpendicular to

a level plane passing said given point and said optical axis varies depending on a position of said given point in the longitudinal direction thereof.

9. An optical waveguide type diffraction grating device comprising N (N being an integer not smaller than 2) refractive index modulated parts formed along a longitudinal direction of an optical waveguide;

wherein respective lines perpendicular to refractive index level planes of said N refractive index modulated parts are not parallel to an optical axis of said optical waveguide;

wherein respective deflection angle planes formed between lines perpendicular to refractive index level planes of said N refractive index modulated parts and said optical axis of said optical waveguide do not coincide with each other; and

where two of said N refractive index modulated parts have respective forming areas overlapping each other at least partially.

10. An optical waveguide type diffraction grating according to claim 9, wherein respective deflection angle planes of said N refractive index modulated parts shift from each other at intervals of 180 degrees/N about said optical axis of said optical waveguide.

11. An optical waveguide type diffraction grating according to claim 9, wherein, in said N refractive index modulated parts, respective lines perpendicular to

refractive index level planes form the same angle with said optical axis of said optical waveguide, respective forming areas have the same length along said longitudinal direction of said optical waveguide, respective refractive index modulation periods are the same, and respective refractive index modulation amplitudes are the same.

12. An optical waveguide type diffraction grating according to claim 9, wherein a polarization-dependent loss at a wavelength yielding the maximum transmission loss is not greater than 1/10 of the maximum transmission loss value.

13. A method of making an optical waveguide type diffraction grating device, said method comprising the step of forming an optical waveguide type diffraction grating device;

wherein, while successively forming N (N being an integer not smaller than 2) refractive index modulated parts along a longitudinal direction of an optical waveguide such that respective lines perpendicular to refractive index level planes are not parallel to an optical axis of said optical waveguide,

the n-th (n being an integer of at least 2 but not greater than N) refractive index modulated part is formed such that a deflection angle plane formed between a line perpendicular to a refractive index level plane and said optical axis of said optical waveguide does not coincide with any of respective deflection angle planes of the refractive index modulated parts of already formed first

to (n-1)-th refractive index modulated parts; and

two of said N refractive index modulated parts have respective forming areas overlapping each other at least partially.

14. A method of making an optical waveguide type diffraction grating device according to claim 13, wherein respective deflection angle planes of said N refractive index modulated parts are shifted from each other at intervals of 180 degrees/N about said optical axis of said optical waveguide.

15. A method of making an optical waveguide type diffraction grating device according to claim 13, wherein said N refractive index modulated parts are formed such that respective lines perpendicular to refractive index level planes form the same angle with said optical axis of said optical waveguide, respective forming areas have the same length along said longitudinal direction of said optical waveguide, respective refractive index modulation periods are the same, and respective refractive index modulation amplitudes are the same.

16. A method of making an optical waveguide type diffraction grating device according to claim 13, wherein each of said N refractive index modulated parts is formed while monitoring a transmission loss.

17. A method of making an optical waveguide type diffraction grating device according to claim 13, wherein each of said N refractive index modulated parts is formed while monitoring

a polarization-dependent loss.

18. An optical waveguide type diffraction grating device according to claim 9, wherein the deflection angle planes of each of said N refractive index modulated parts shift from each other at intervals of 360 degrees/N about the optical axis of said optical waveguide.

19. An optical waveguide type filter according to claim 1, wherein said periodically perturbation part is separated into N groups in the longitudinal direction of the optical waveguide, and said plane of each group shifts at intervals of 90 degrees/N about the optical axis.